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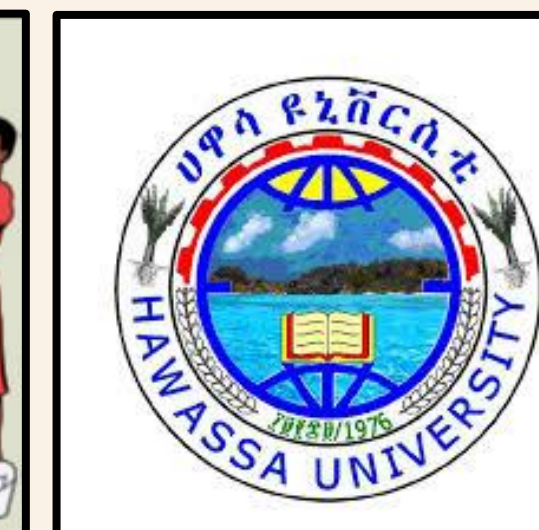
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# Availability and Consumption of Vitamin A Foods among Southern Ethiopian and Zambian Primary Students

Trang Vuong



## ABSTRACT

**Purpose:** Understand vitamin A food availability in open-air markets (OAM's), and consumption of those foods by primary school children in southern Ethiopia/Zambia.

**Methods:** Conducted inventories of all consumable/potable items and interviewed 6-7<sup>th</sup> grade students about consumption of items with vitamin A.

**Results:** Students consumed most of the 14 vitamin A foods/items sold in OAM's. Zambian students ate more liver, pumpkin, squash, watermelon, and wild fruits, while Ethiopian students almost never consumed squash, watermelon or wild fruits.

**Conclusions:** The availability of Vitamin A foods in Ethiopian and Zambian OAMs are varied; however, Zambian children reportedly eat more vitamin A foods. Nutrition education is warranted.

## INTRODUCTION

- Vitamin A is necessary for metabolic activities and retinol pigment production in the eye. It also contributes to health of teeth, skin, and mucus membranes. However, vitamin A deficiency causes night blindness, exophthalmos (bulging of the eye), delayed growth, and respiratory infection (Medline Plus 2020).
- In Ethiopia, based on low serum retinol levels from blood samples, children from 6 - 71 months of age had high rates of vitamin A deficiency (Demissie, Ali, Mekonen, Haider, Umeta 2010).
- By contrast, 59% of Zambian children, 5-7 years old, had hypervitaminosis A based on the RID test, and hypercarotenemia of the skin due to excessive consumption of mangos seasonally (Tanumihardjo, Kaliwile, Boy, Dhansay, van Stuijvenberg 2018).
- Within Sub-Saharan Africa, 49% of children 0 -59 months of age had a higher risk of morbidity and mortality due to vitamin A deficiency. However, in countries where vitamin A supplementation has been offered, mortality rates are reduced by 25% (Aguayo and Baker 2005).
- It is unclear which foods with vitamin A are available in OAMs and which of the available foods are consumed by primary school children in Ethiopia or Zambia.

## METHODS

- Participants:**
- 6<sup>th</sup> - 7<sup>th</sup> graded school students
  - 5 schools in Zambia (n = 369) and 4 schools in Ethiopia (n = 182)
- Markets:**
- Maraba Market, Livingstone, Zambia and Hawassa Market, Hawassa, Ethiopia
- Environment:**
- Zambia's Southern Province, within 1 hour of Livingstone
  - Ethiopia's Sidama Region (formerly SNNPR), within 1 hour of Hawassa Town
- Research design:**
- Research conducted under IRB #20150515251 EP
  - Parents' gave permission for children's participation and students could opt out at any time
  - Data collected from May-June of 2019
  - Interviews conducted on food habits; Market Inventories conducted to establish food availability
- Statistical Analyses:**
- Data entered into Excel
  - Uploaded to *Statistica* for descriptive and univariate analyses



## RESULTS

- In total, there were 14 different foods or consumables containing vitamin A that could be purchased in OAM's of Southern Ethiopia and Zambia.
- Combined, Ethiopian & Zambian OAMs sold the following items that contain vitamin A:
  - ✓ **Fruits** – Mango, Papaya, Pumpkin, Squash, Watermelon, Wild Fruits
  - ✓ **Proteins** - eggs, liver
  - ✓ **Dairy Items** – Cheese, Milk, Yogurt
  - ✓ **Leafy Green Vegetables** – e.g., Pumpkin Leaves
  - ✓ **Processed Sugar (Zambia only)**
- Six fruits, two proteins, three dairy items, and multiple leafy green vegetables were available for purchase (Table 1; Figures 3-5,7-8).
- Approximately equal numbers of Ethiopian and Zambian children indicated that they consumed carrots, leafy green vegetables, and papaya.
- Zambian children consumed more cheese, eggs, liver, pumpkin, squash, & watermelon.
- By contrast, Ethiopian children reported that they seldom consumed squash, watermelon, or wild-harvested fruits.

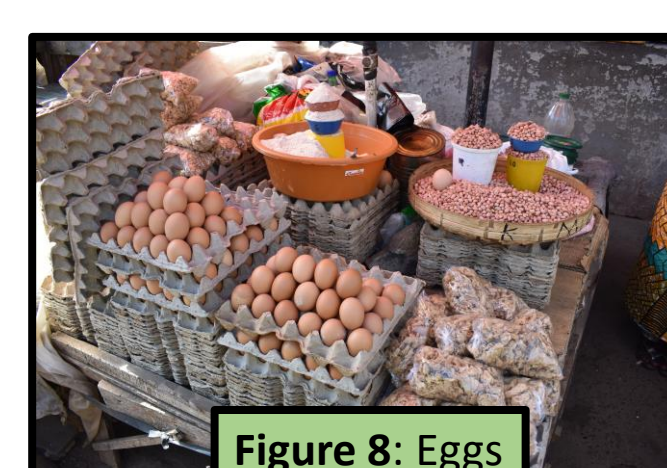
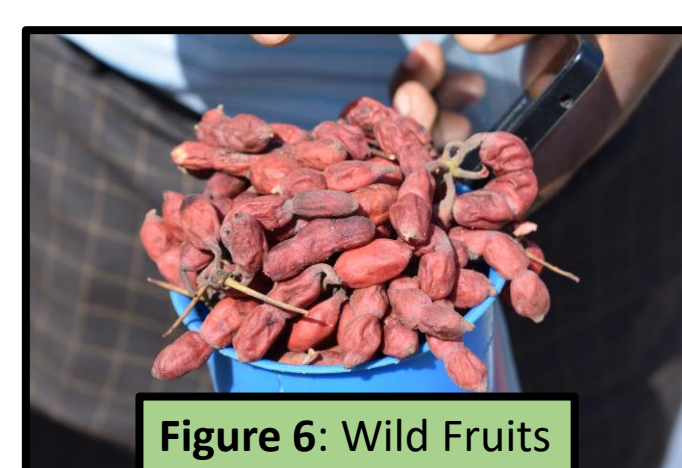
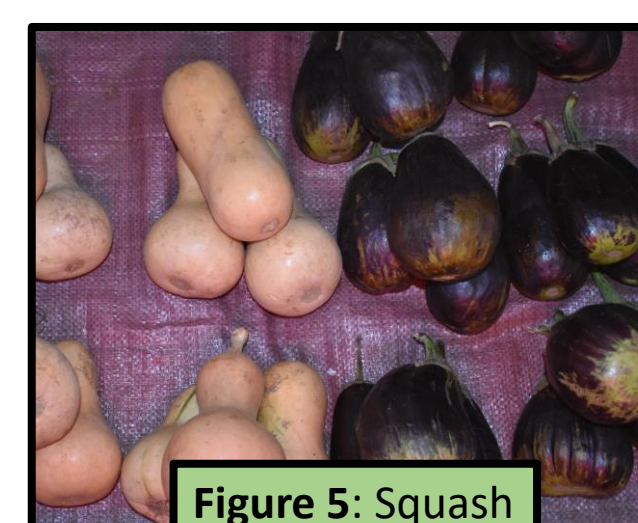
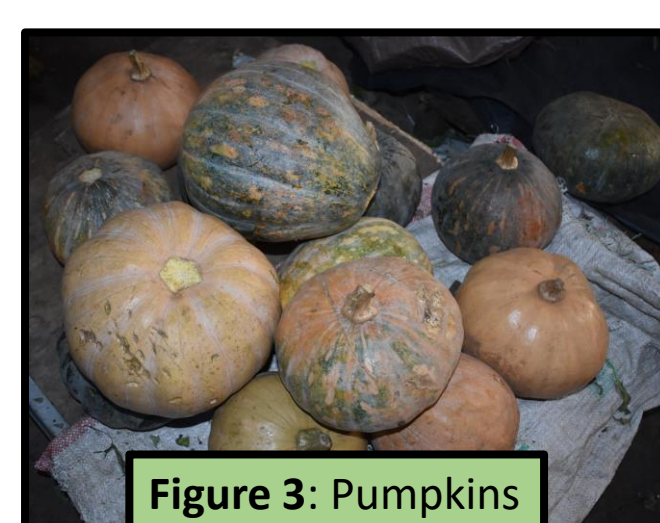


TABLE 1: Foods with vitamin A IN Zambian and Ethiopian OAMs

FOOD	% RDI	ZAMBIA			ETHIOPIA		
		Never	Sometimes	Always	Never	Sometimes	Always
Carrots	10	7%	84%	6%	6%	84%	8.6%
Cheese	62	23%	72%	4.3%	37%	59%	5%
Egg	18	7%	90%	1.8%	5.3%	81%	1.3%
Leafy Green Vegetables	15	0.3%	56%	43%	0	44%	30%
Liver		15%	79%	4.6%	46%	49%	1.2%
Mango		1%	81%	1.8%	3.7%	69%	27%
Milk		5.3%	83%	10%	36%	59%	3.7%
Papaya	113	15%	73%	10%	9.8%	71%	19%
Pumpkin	59	5.3%	83%	10%	36%	59%	3.7%
Squash	64	37%	30%	2%	64%	9.2%	1.2%
Watermelon	15	10%	80%	9%	79%	19%	1.2%
Wild Fruits		10%	66%	23%	61%	37%	0.6%
Yogurt	7	9%	79%	10%	16%	72%	12.3%

Note: Green Highlight denotes different consumption patterns between countries

## DISCUSSION

- Vitamin A deficiency is common in Sub-Saharan Africa, including countries such as Ethiopia and Zambia (Aguayo VM, Baker SK 2005; Zambia DHS 2018), however, little is known about available foods with vitamin A.
- At least 14 foods containing vitamin A could be purchased in the OAMs of both countries; however, children in southern Zambia reported that they consumed more food with vitamin A, compared to children in southern Ethiopia.
- In addition, children in Zambia had easier access to foods with the greatest amount of vitamin-A, e.g., pumpkin and squash. Zambia's government also requires that sugar be fortified with vitamin A and Zambian children reported eating or drinking sugar-rich items on a daily basis (Zambia DHS 2018).
- Based on self-reported consumption patterns, children of southern Zambia are more likely to have meet the % of Recommended Daily Intake (RDI) of vitamin A, i.e., 700-900 mcg per days for adult women and men, respectively. However, families from rural communities may not have easy access to OAMs due to their location or to the cost of purchasing food items such as fruits or dairy.
- There are limitations to this study. Data were collected in a single season and year; consequently, we may have missed some foods. Children may not have been accurate in reporting what they consumed or how much they ate of a particular item. They may also have limited knowledge about the importance of vitamin A consumption in maintaining their overall health.
- Even if food is available, it may not be eaten on a regular basis, if at all, for a variety of reasons. Nevertheless, one food common to both populations is carrots, and the consumption of one large carrot per day would meet or exceed the RDI for an individual. Thus, nutrition education is important for primary school children to improve their overall health and consumption of vitamin-A.

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